FINAL

Groundwater Monitoring and Mitigation Plan
Jacumba Community Services District
Jacumba Hot Springs, San Diego County, California

Lead Agency:

County of San Diego
Planning and Development Services
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TABLE OF CONTENTS

FIGURES

TABLE

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1.0 INTRODUCTION

Jacumba Community Services District (JCSD) has been identified as a potential source of non-potable water for the Rugged and Tierra del Sol Solar Farm Projects (the Projects). The Projects' on-site wells cannot meet the peak water demands during the construction phase. The water provided by JCSD would be used to supplement non-potable water required during construction of the proposed Projects. This Groundwater Monitoring and Mitigation Plan (GMMP) has been prepared by Dudek in order to provide protection of nearby groundwater dependent habitat and ensure adequate groundwater supply for other groundwater users in the area.

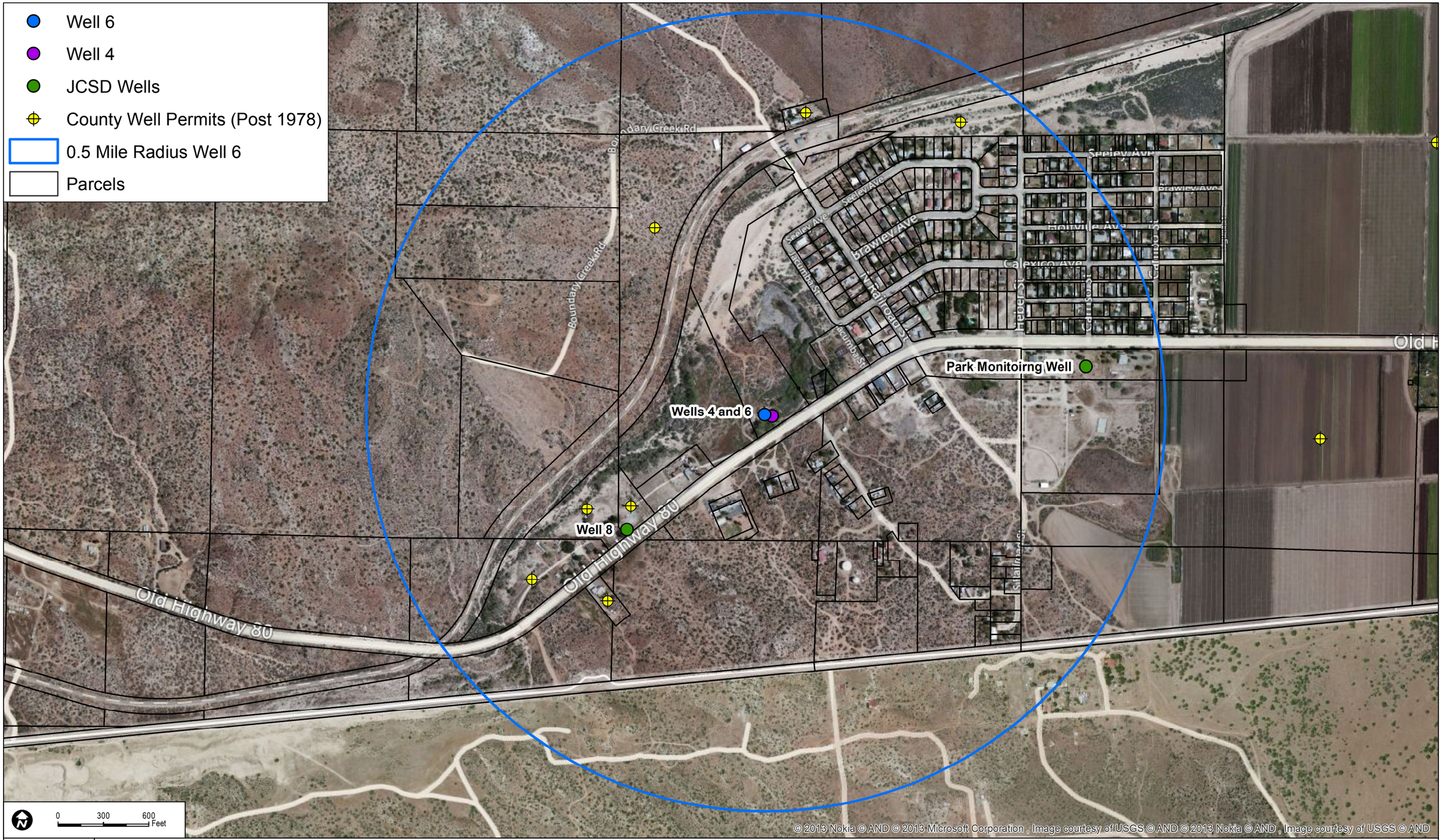
As described in the Groundwater Resources Investigation Report for the Jacumba Community Services District (Dudek, 2013), the Rugged Project is expected to require approximately 16 acre-feet of off-site water during the first 65 days of construction. The Tierra del Sol Project is anticipated to require approximately 32 acre-feet of off-site water during the first two months of construction. The JCSD has a non-potable well (Well 6) dedicated for off-site construction water supply use. Well 6 is located at the west end of downtown Jacumba Hot Springs on assessor's parcel number (APN) 660-040-32 (Figure 1). Historically, pumping at Well 6 has been limited to a production of up to 80,000 gallons per day (gpd), which represents approximately 9% of the production capacity of the well (Dudek, 2013). There have not been any recorded instances of well interference or deleterious impacts to groundwater storage as a result of pumping Well 6 at 80,000 gpd for off-site water supply.

In order to provide a conservative analysis, the Groundwater Resources Investigation Report for the Jacumba Community Services District assumed that Well 6 would supply all of the 16 acre-feet of required off-site water for the Rugged Project and the 32 acre-feet required for the Tierra del Sol Project. Results of the Groundwater Resources Investigation indicate that short-term pumping of Well 6 to supplement the Projects' construction water demand would result in a less than significant impact to groundwater storage. Assuming the entire 48 acre-foot water demand was withdrawn from Well 6 at a limited production rate of 80,000 gpd, it would take 196 days to produce the required volume of water. Over this 196 day period, the estimated drawdown at the nearest well (JCSD Well 4) is 0.83 feet (Dudek, 2013). This is less than the County of San Diego well interference threshold guidance for alluvial wells.

The drawdown at the nearest groundwater dependent habitat as a result of extraction of groundwater for construction use is also estimated at approximately 0.83 feet and would not exceed the historical low water level recorded in Well 4 of approximately 23 feet below ground surface (bgs) (Dudek 2013). Thus, impacts to groundwater dependent habitat would be less than significant.

Because actual conditions during groundwater extraction for the Projects may vary from conditions assumed in the Groundwater Resources Investigation (Dudek, 2103) this GMMP has been prepared for the Jacumba Community Services District. This GMMP establishes protective groundwater drawdown thresholds for off-site well interference and groundwater-dependent habitat.

This GMMP also describes the monitoring, mitigation and reporting procedures by which the County of San Diego Planning and Development Services (PDS) can ensure that the conditions and criteria for the Project's groundwater extraction activities are continually being upheld. An 18 month monitoring period is proposed to assess the impact of the short-term construction water demand.



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SOURCE: County of San Diego, JCSD, SanGIS

FIGURE 1

On-site and Off-site Well Locations

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2.0 ESTABLISHMENT OF GROUNDWATER THRESHOLDS

According to the County of San Diego Guidelines for Determining Significance and Report Format Content Requirements (County of San Diego, 2007), this Project-related groundwater extraction would incur a significant well interference impact if it results in a decrease in saturated thickness of 5% (20 feet or greater off-site groundwater drawdown in a fractured rock aquifer assuming 400 feet saturated thickness and a 5 foot or greater off-site groundwater drawdown in an alluvial aquifer assuming 100 feet of saturated thickness). Additionally, The County's Guidelines for Determining Significance for Biological Resources (County of San Diego, 2010) defines a project-related drawdown of 3 feet below historical low groundwater levels as causing a significant impact to riparian habitat of a groundwater sensitive natural community. The thresholds established below incorporate these guidelines and represent a conservative basis for monitoring and mitigating potential groundwater impacts related to the Project.

2.1 Potential Off-Site Well Interference

As described in the Groundwater Resources Investigation Report (Dudek, 2013), the JCSD wells identified in the vicinity of the pumping well (Well 6) include Wells 4, 7, 8 and the Park Monitoring Well (Figure 1). Well 4 is completed to an approximate depth of 39 feet and depth to water was measured at 7.00 feet below top of casing (btoc) on August 17, 2013. Well 4 is a potable water production well and from January through November 2013 has supplied 30 million gallons (92.1 acre-feet) to meet the water demands of the potable water system (Troutt pers. comm. 2013). Well 6 was drilled to a depth of 465 feet in 2003 and depth to water was measured at 3.75 feet btoc on August 17, 2013. Well 7 and Well 8 were both drilled to a depth of 518 feet in 2008 and 2009, respectively. Depth to water in Well 8 was measured at 28.67 feet btoc on January 11, 2012. No depth to water was measured for Well 7. The Park Monitoring Well depth of completion is unknown; depth to water was measured at 52.29 feet btoc on August 17, 2013.

The five existing JCSD groundwater wells (Well 4, 6, 7, 8 and the Park Monitoring Well) will be included in the groundwater monitoring program (Figure 1). These wells and Well 6 will be fitted with pressure transducers prior to the onset of Project pumping. The pressure transducers will record the water level in the wells at 15 minute intervals for approximately 1 month prior to the onset of Project related groundwater extraction. Transducer accuracy will be confirmed through manual water level measurements recorded with a sounder. Manual water levels will also be recorded for JCSD Wells 4, 6, 7, 8 and the Park Monitoring Well on a weekly basis during Project pumping.

An additional five wells were identified from confidential well logs and a site reconnaissance; these wells, located within a 0.5 mile radius of Well 6, are indicated in Table 1.

Table 1
JCSD Wells within 0.5 Mile Radius of Well 6

Well Number	APN	Use	Distance from Well 6 (feet)
Well 4	660-040-32	Public/Active	60
Well 7	660-040-26	Public	1,206
Well 8	660-040-26	Public/Inactive	1,206
Park Monitoring Well		Public/Inactive	2,151
Private and Confidential Wells[a]			
7965		Domestic	1,540
15216		Domestic	1,955
16137		Domestic	1,300
18049		Domestic	1,950
20019		Domestic	1,000

Notes:
a. Assessor parcel numbers (APN) are redacted for confidential well logs.

The measurements collected from the JCSD wells will be used to establish a water level baseline and capture water level patterns generated by pumping of these wells. An understanding of these patterns will allow for their continued use as monitoring wells despite the possibility that they may be pumped over the duration of the Projects. During pumping at Well 6, a maximum drawdown of 10 feet below the water level baseline at JCSD Wells 7 and 8 will be allowed. This threshold is protective of a maximum drawdown of 10 feet at the closest property with a residential groundwater well located within 0.5 mile feet from the pumping well. This protective threshold will prevent drawdown at the nearest off-site wells from approaching the 10 feet threshold set forth by the County. The 10 foot threshold is a hybrid of the 20 feet or greater off-site groundwater drawdown in a fractured rock aquifer and the 5 feet or greater off-site groundwater drawdown in an alluvial aquifer developed in consultation with the County Groundwater Geologist as both alluvial and fractured rock aquifers are present in the vicinity of Well 6. Additionally, a maximum drawdown of 5 feet below the water level baseline will be allowed at JCSD Well 4. Well 4 is a shallow alluvial well and the County of San Diego Guidelines for Determining Significance establishes a 5 foot decline in water level as the appropriate threshold for alluvial aquifers.

Results of the off-site well interference analysis detailed in the Groundwater Resources Investigation Report conclude that well interference is not anticipated to pose a significant impact. A groundwater monitoring program will be implemented in order to establish a water level baseline in the JCSD wells and characterize change in water levels due to potable and non-potable water system pumping.

2.2 Groundwater Dependent Habitat

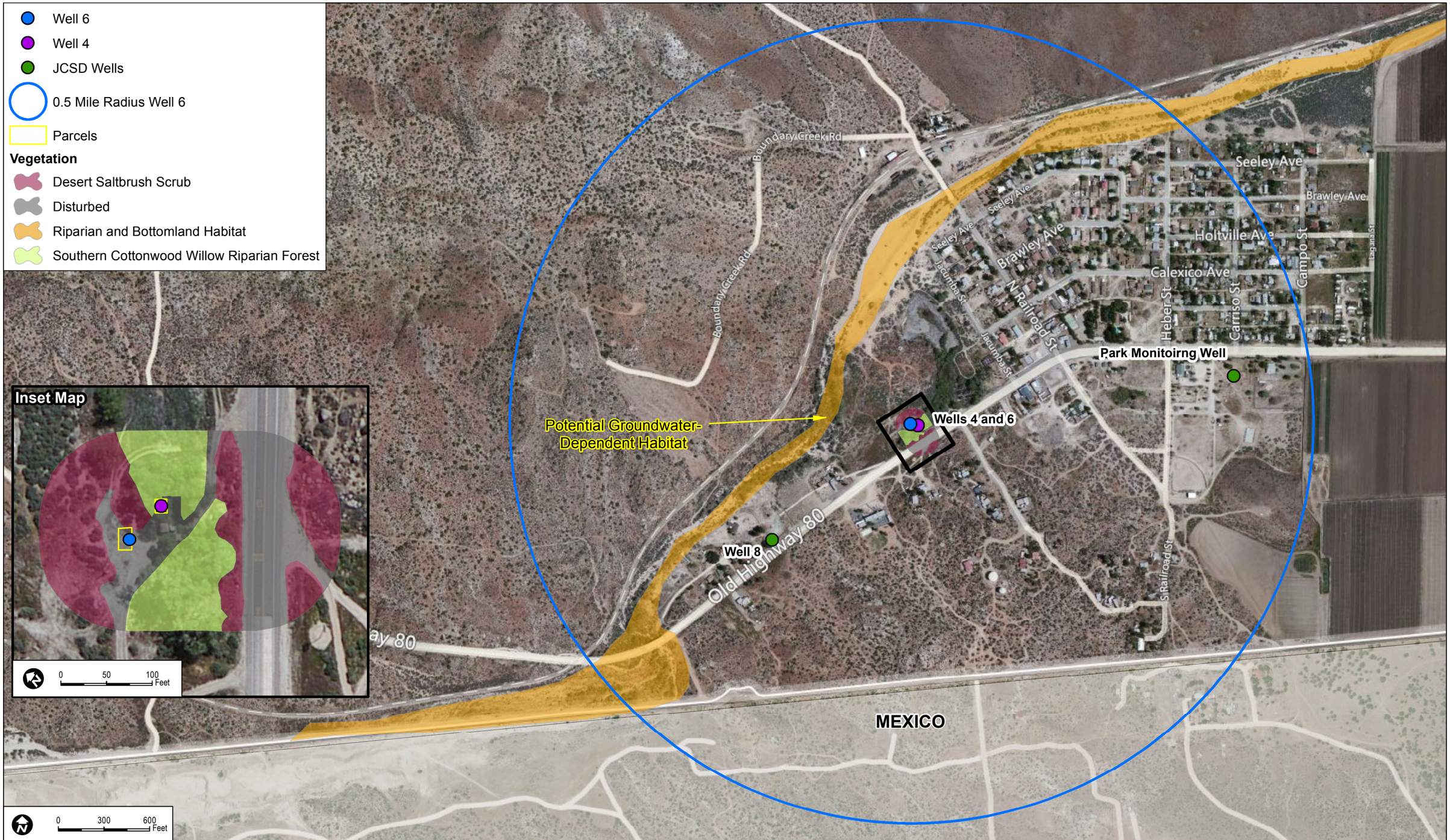
Two groundwater-dependent vegetation communities mapped in the vicinity of Well 6 and Well 4 that may depend on groundwater: desert saltbrush scrub and southern cottonwood willow riparian forest (AECOM, 2011). In addition, several dirt roads located within the vicinity of the wells are classified as disturbed cover type. The area to the east of the wells has been mapped as a lake/wetland on the Jacumba USGS topographic map (Dudek, 2013) and as freshwater emergent wetland on the U.S. Fish and Wildlife Service (FWS) National Wetland Inventory. Habitat associated with Boundary Creek, located to the north and west of Well 6, is mapped as riparian and bottomland habitat (Figure 2).

The majority of desert saltbrush scrub is mapped north and west of Well 6 and extends to an adjacent parcel to the east, where the desert saltbrush scrub is mapped north and south of Old Highway 80 (Figure 2). The majority of the southern cottonwood willow riparian forest is mapped northeast and southwest of Well 4 and Well 6 (Figure 2). The saltbush scrub and southern cottonwood willow riparian forest are located approximately 25 feet and 50 feet, respectively from Well 6. Results of the Groundwater Resources Investigation Report indicate that there is limited hydraulic connection between primary producing fractures of the pumping well (Well 6) and the shallow alluvial aquifer system. Drawdown in the alluvial aquifer is estimated to be less than drawdown in the fractured rock aquifer as the deeper hot spring aquifer does not appear to be hydraulically connected to the shallow aquifer. The shallow and deep aquifers have different water quality and water temperature and do not appear to be in communication.

Additionally, there is no apparent hydraulic response in Well 4, which is completed to an approximate depth of 39 feet, when Well 6 is pumped (Troutt, pers. comm. 2013). JCSD has provided the San Diego Gas and Electric (SDG&E) East County (ECO) Substation project with 9.6 million gallons (29.5 acre-feet) of non-potable water pumped from Well 6 between March 2013 and November 2013. This construction water demand does not appear to have impacted the water level of the shallow alluvial aquifer (Dudek, 2013 and Troutt, pers. comm. 2013). Therefore, project-related groundwater production from Well 6 is not anticipated to result in drawdown of the groundwater table to the detriment of this groundwater-dependent habitat.

Due to the limited hydraulic connection between the shallow alluvial aquifer supporting the groundwater dependent habitat and the deep aquifer that Well 6 extracts from and the relatively short-term timeframe of proposed groundwater withdraw, Dudek recommends no initial monitoring of the groundwater habitat. Monitoring of the groundwater dependent habitat would be required in the event that water levels in Wells 4 and 6 drop 5 feet and 10

feet, respectively below baseline pumping water level conditions. Aquifer water level monitoring for the duration of pumping at Well 6 for the Projects is proposed. If groundwater levels exceed thresholds established for Wells 4 and 6 than monitoring of groundwater dependent habitat would be required. Biological monitoring procedures are described below in Section 3.2.



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SOURCE: Bing Maps, SanGIS, Dudek 2012, AECOM 2011

FIGURE 2
Potential Groundwater-Dependent Vegetation

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3.0 MONITORING PROCEDURES AND MITIGATION CRITERIA

The groundwater and biological monitoring procedures and mitigation criteria outlined below will be followed during the duration of pumping at Well 6 for the purpose of off-site water supply to the Projects. The groundwater monitoring program defined herein will be carried out under the direction of a Certified Hydrogeologist registered in the State of California.

3.1 Groundwater Production and Water Level Monitoring

Pressure transducers will be maintained in a network of the four JCSD groundwater wells (Well 4, Well 7, Well 8, and the Park Monitoring Well, Figure 1) as well as in the production well (Well 6). The pressure transducers will be programed to record the water level every 15 minutes. In addition, ambient barometric pressure and temperature will be recorded at 15 minute intervals with a barometric logger.

Transducer data will be downloaded on a weekly basis at all the instrumented wells for 1 month prior to the onset of Project related groundwater extraction. Transducer data will also be downloaded weekly during periods of pumping for non-potable construction water supply to the Projects. Cumulative groundwater usage will be monitored at Well 6 using an instantaneous flow meter. Flow rate and volume measurements will be recorded daily during pumping for the Projects. The shallow alluvial Well 4 transducer data will be used to observe the effect of construction water production from the deep, fractured rock aquifer on the water level in the shallow alluvial aquifer.

3.2 Groundwater Dependent Habitat Monitoring

The following monitoring program will be carried out for groundwater dependent habitat if water levels in Wells 4 and 6 drop below the established thresholds. The goal would be to determine if the project's use of groundwater is impacting groundwater dependent habitat in the vicinity of the production well.

3.2.1 Monitoring

Baseline data will be collected within a 1,500 feet radius of Well 6 and confined to groundwater dependent habitat; specifically the riparian corridor associated with Boundary Creek. The 1,500 feet radius was selected based on the distance drawdown of 5 feet is estimated to result from Project pumping based on the Cooper-Jacob approximation of the Theis non-equilibrium flow equation analysis. Potentially affected native trees within the study area would be evaluated for overall physical condition and attributes. The trees would be inventoried by an ISA Certified Arborist or Registered Professional Forester with specific experience evaluating native oak species, in particular coast live oaks. The baseline monitoring evaluations would include the following:

- Establishment of 15 equidistant plots or transects within the riparian and bottomland habitat within 1,500 feet of Well 6. Sample plots/transects would include the range of existing habitat conditions, including elevation, slope and aspect, proximity to roads and other land uses.

- Tagging of trees and recording species, tag number, trunk diameter at breast height (dbh) (in.), height (ft.) and dominance (i.e., whether the tree is under the canopy of another tree or forms the uppermost canopy). Slope, aspect, and elevation of each tree location, existing understory species (including proportion of natives to exotics), presence of debris and litter, and soil type, depth, and parent material will be noted for each tree or plot/transect.
- Assessment of tree status, including documentation of:
  - Dbh measured at 4.5 feet above ground (according to standard practices)
  - Number of stems
  - Overall tree height (based on ocular estimates)
  - Tree crown spread (measurement in each cardinal direction, based on ocular estimate)
  - Overall tree health condition (Good, Fair, Poor, Dead)
  - Overall tree structural condition (Good, Fair, Poor, Dead)
  - Pest presence (Type, Extent – minimal, moderate, high)
  - Disease presence (Type, Extent – minimal, moderate, high)
  - Other specific comments
- Assessment of acorn production, seedling establishment and sapling tree densities and conditions
- The data collection procedure will include full data collection at each plot/transect so that consistency is maintained among sampling plots.
- Creation of database using GIS or similar application

3.3 Groundwater Mitigation Criteria

The following mitigation criteria will be established to protect groundwater resources and groundwater-dependent habitat in the Project area:

- If the groundwater levels at JCSD Wells 7 or 8 drops 10 feet below the baseline water levels, or if the groundwater level at Well 4 drops 5 feet below the baseline water level,

groundwater pumping at Well 6 will cease until the water level at the well that experienced the threshold exceedance has increased above the threshold and remained there for at least 30 continuous days. Additionally, written permission from the County Planning and Development Services (PDS) must be obtained before production may be resumed.

- If groundwater levels at Well 6 drops more than 20 feet or at Well 4 drops more than 10 feet below baseline water levels, than monitoring of the groundwater dependent habitat would be triggered.
- If the groundwater levels exceed historical low water levels in Well 4 (lowest recorded static water level in Well 4 is 23 bgs) and there is evidence of deteriorating riparian habitat health by the Arborist or Forester, there may be a temporary or permanent cessation of pumping at Well 6. If evidence of deterioration persists after a 5 year period, mitigation will consist of offsite wetland/oak woodland credits at a 3:1 ratio.

4.0 REPORTING REQUIREMENTS

A groundwater monitoring report will be completed by a Certified Hydrogeologist registered in the State of California and submitted to the County PDS no later than 28 days following the end of groundwater extraction from Well 6 to supplement the Projects' water demand. The report will include the following information:

- Water level hydrographs and tabulated water level data for each monitoring well.
- Tabulated groundwater production volumes from each production well.
- Documentation of groundwater drawdown at JCSD Wells 4, 7, 8 and Park Monitoring Well included in the groundwater monitoring program.
- Documentation of any threshold-included curtailment of groundwater production.
- Documentation of groundwater dependent habitat monitoring as described above.

If the baseline water levels at the JCSD wells included in the groundwater monitoring program are exceeded by 5 feet, the County PDS will be notified via letter and electronic mail within five working days of the exceedance. Additionally, if water level thresholds at the off-site wells are exceeded by their respective thresholds, pumping of Well 6 shall cease and the County PDS notified via letter and electronic mail within five working days.

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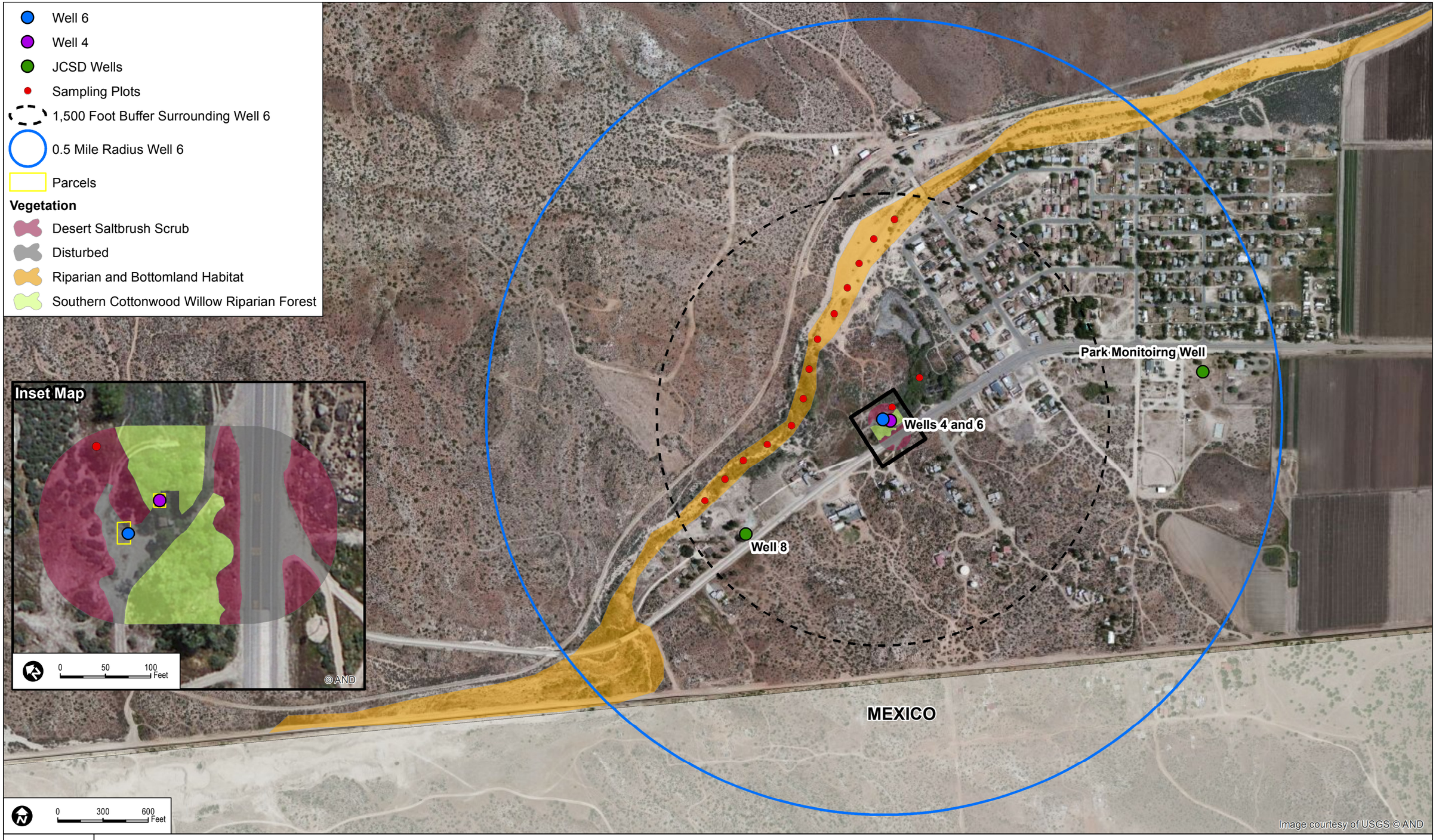

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SOURCE: Bing Maps, SanGIS, Dudek 2012, AECOM 2011

FIGURE 3
Potential Groundwater-Dependent Vegetation Monitoring Locations

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5.0 REFERENCES

AECOM, 2011. Energia Sierra Juarez (ESJ) Well Access Road – Project Number 09-0107420 Biological Letter Report. February 3, 2011.

County of San Diego. 2007 *County of San Diego, Guidelines for Determining Significance and Report Format and Content Requirements: Groundwater Resources*. Land Use and Environment Group, Department of Planning and Land Use, Department of Public Works. March 19, 2007.

County of San Diego. 2010 *County of San Diego, Guidelines for Determining Significance: Biological Resources.* Land Use and Environment Group, Department of Planning and Land Use, Department of Public Works. September 15, 2010.

Dudek. 2013. *Jacumba Community Services District Groundwater Resources Investigation Report*. Prepared for County of San Diego Planning and Development Services. November 2013.

Troutt, D. 2013. Personal communication from D. Troutt (General Manger Jacumba Community Services District). December, 2013.

6.0 LIST OF PREPARERS

This GMMP was prepared by Dudek Hydrogeologists, Trey Driscoll, PG, CHG and Patrick Rentz Roach. Dudek arborist, Michael S. Huff prepared the monitoring program for the groundwater dependent habitat. Dudek Hydrogeologist Stephen K. Dickey, PG, CHG, CEG, provided review assistance and coordination with the County as the County-approved hydrogeologist. Peter Quinlan, RG and principal-in-charge; and Jill Weinberger, PhD, PG, provided peer review of this GMMP.